Meridian 1

Flexible Numbering Plan

Description, operation, and administration

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Introduction

Flexible Numbering Plan (FNP) package 160 was introduced to the International marketplace as part of the X11 with Supplementary Features Group E (Phase 5) Release.

FNP accommodates Global Numbering Plan requirements by modifying the Electronic Switched Network (ESN) dialing plan. The dialing plans are divided into two areas:

— **On-network (on-net) dialing**—which deals with all the possible dialing situations required when dialing to a station located within the Local (private) Network, and

— **Off-network (off-net) dialing**—which deals with all the possible dialing situations required when dialing to a station that is not part of the Local Network (typically the Public Numbering Plan).

FNP was enhanced in the Group F (Phase 6Biv) Release to include the ability of inhibiting the time out handling process for ESN Basic Alternate Route Selection (BARS) and Network Alternate Route Selection (NARS) Special Numbers (SPN) and Coordinated Dialing Plan (CDP) Trunk Steering Codes (TSC). The enhancement ensures that all digits are collected prior to seizing a trunk. This enhancement meets Chinese requirements.

FNP was again enhanced in the Group G (Phase 7) Release to include Supplemental Digit Restriction or Recognition (SDRR). With this functionality FNP is able to analyze up to 16 digits.

Network Alternate Route Selection (NARS) package 58 is a prerequisite for FNP.

With X11 Release 20, FNP was introduced to the Global marketplace.

With X11 Release 23, Flexible Numbering Plan Enhancement (FPE) allows the FNP feature to be enabled/disabled at the customer level in Overlay 15 without changing the functionality of FNP.

FNP interacts with both NARS and Coordinated Dialing Plan (CDP) to introduce:

— Universal Numbering Plan (UNP),

— Transferrable Directory Numbers (TNDN),

— Group Dialing Plan (GDP),

— Varying Length DN on a node, and

— Free Special Number Screening (FSNS).

Description

On-net dialing

This section deals with the dialing required to reach a station which is located in the same network.

Flexible Numbering Plan allows the length of Location Codes (LOC) to vary from node to node. As well, the total number of digits dialed to get to a station can vary from station to station.

FNP allows flexible length DNs throughout the network. For instance, the number of digits that make up a DN can vary from station to station. This capability allows existing networks to modify their dialing plan. An existing four digit network can go to five or six digit numbers when adding new switches, while keeping the existing four digit plan as is.

When Uniform Dialing Plan (UDP) is in effect, stations calling other stations on the same switch can skip the node identification digits. The on-net Location Codes can be one to seven digits in length, while the total number of digits dialed can be one to ten. To use UDP, a station user dials the Location Code of the desired node, then the DN of the station at that node. The digits dialed to get to a station can be the same from any switch in the network.

When Coordinated Dialing Plan (CDP) is used, stations on any switch are represented by unique three to ten digit numbers (since Release 13). A station on one switch can call a station at another switch within the CDP group by dialing the unique three to ten digit number without access codes and associated optional pauses for dial tone. With existing features, the number of digits dialed to a particular node (NCDP) must be the same for all stations on that node. If fewer digits than NCDP are dialed, the system times out and gives overflow tone. With Flexible Numbering Plan (FNP), any station on any switch is represented by a unique one digit to ten digits number. Moreover, DNs of different lengths can coexist on the same switch. Termination is attempted when the system times out, even if the expected number of digits is not dialed.

When the Transferable DN (TNDN) scheme is used, a user can move from one location to another while retaining their DN. The TNDN scheme is supported on a one to seven digit Coordinated Dialing Plan.

Off-net dialing

This section deals with the dialing required to reach a location which is not part of the local network, typically a public exchange station, but it also includes stations which are part of another private network.

FNP is used to accommodate dialing plans which are not based on a fixed length number of digits as the North American Numbering Plan (NANP) is. In North America the dialing plans are fixed length, NXX + XXXX or NPA + NXX + XXXX and ESN dialing plan formats are designed to respond to these consistent dialing patterns. Since this is not the case internationally, Flexible Numbering Plan (FNP) is introduced to allow users to dial numbers of varying lengths to terminate at a destination. Flexibility of the number of digits which can be dialed is achieved by using SPNs (Special Numbers) that utilize the Supplemental Digit restriction or Recognition (SDRR) capability.

ESN allowed a customer to dial off-network numbers. These numbers were recognized at a NARS or BARS switch and translation of the Numbering Plan Area (NPA), Office Code (NXX), or Special Number (SPN) with Supplemental Digit Restriction or Recognition (SDRR) determined the treatment for the call.

Supplemental Digit Restriction or Recognition (SDRR) is applied *after* translating the NPA, NXX, or SPN at an intelligent NARS or BARS switch.

Note: The use of the Alternate Routing Remote Number (ARRN) SDRR capability increases the maximum number of digits that can be analyzed for a SPN from 11 to 16.

Call Processing stops until the expected digits have been received. The expected digits are then compared to the numbers defined in the Supplemental Digit Restriction or Recognition Table:

— If a match is found and specified as a recognized DID or DDD number terminating at a Conventional Main switch (recognition takes place at the last intelligent NARS or BARS switch), Route Selection with the Route List Index defined for the NPA, NXX, or SPN number is performed. A special digit manipulation is applied so that the proper numbers are outpulsed to terminate directly at the station or attendant of the Conventional Main switch. If the trunk is any trunk type other than Tie, then the termination is processed by the current software with Digit Manipulation if necessary.

— Otherwise, the call is passed to Route Selection with the Route List Index associated with that NPA, NXX, or SPN number.

ESN did not allow alternate routing for these numbers. In countries not on the North American continent, this was a major drawback because it led to configuration problems for SPN numbers.

With FNP a new type of number is introduced in the SDRR block. It is called an Alternate Routing Remote Number (ARRN). Following each SPN (and only SPNs), a customer can configure ARRNs. For each of these numbers, it is also possible to configure an Alternate Route List Index.

Call processing follows the same steps as previously mentioned. The expected digits are compared to the numbers defined in the SDRR table and one of the following occurs:

— If a match is found and specified as a recognized ARRN number, Route Selection with the ARLI defined for that number is performed.

— If a match is not found, Route Selection is called with the Route List Index found in the table. (One RLI per SPN number).

Operation

On-net dialing

This section deals with the dialing required to reach a station which is located in the same network. Any station in the network is represented by a flexible number of digits. This includes the use of Uniform Dialing Plan such as LOC + DN, or Universal Numbering Plans; for example, CDP.

Location code

Flexible length Location Codes (LOC) have been available since Release 8. This allows three to seven digit LOCs. Currently, the flexible length LOC code does not change the length of the number which a user is allowed to dial, but only changes which portions of the number are recognized as different components. Therefore, if a LOC is dialed, seven digits are expected before any attempt is made to terminate the call.

The FNP feature allows the specification of the total number of digits, up to ten, which are required to terminate on a station at a particular node. As well, one to seven digit LOCs are allowed.

When a LOC is dialed, a Route List Block (RLB) is used to make routing decisions. The number of digits expected is defined by the response to the Flexible Length (FLEN) prompt, prompted when the LOC is defined. FLEN allows the length of the number dialed to be up to 10 digits. If the user dials a DN shorter than FLEN, termination is attempted when the octothorpe (#) is pressed or when the NARS interdigit timer times out. If the FNP package (160) is not equipped or the response to the FLEN prompt is zero (0), then digit analysis is performed as it was prior to the introduction of FNP.

End-of-dial timing

All NARS end-of-dial timing procedures apply to FNP along with the FNP unique Flexible Length (FLEN) processing. If the user dials the number of digits as defined by the response to the FLEN prompt, then the software considers dialing as being complete and analyzes the digits for call processing purposes.

The following illustrates when termination will be attempted by FNP for various FLEN settings, LOC code lengths, and digits dialed.

number of digits Digits Expected (FLEN)	LOC m=1-7 Length of LOC	+ Digits Dialed	DN FLEN-m Termination
7	3	7	right away.
7	3	6	following # or time out.
7	2	7	right away.
7	2	6	following # or time out.
10	7	10	right away.
10	5	9	following # or time out.
10	5	4	not possible.
10	7	18	when 10 digits are dialed
0			according to CDP, BARS, or NARS operation.

Coordinated Dialing Plan

When Coordinated Dialing Plan (CDP) is used, stations are represented by unique three to ten digit numbers (since Release 13). CDP uses Local Steering Codes (LSC), Distant Steering Codes (DSC), or Trunk Steering Codes (TSC) that are one digit to seven digits long to determine how dialed numbers are reached. A station at one location can call a station at another location within the CDP group by dialing the unique three to ten digit number without access codes and associated optional pauses for dial tone.

Without FNP, the number of CDP (NCDP) digits dialed to reach a particular location must be the same for all stations at that location. If fewer digits than NCDP are dialed, the system times out and gives overflow tone.

With FNP, any station at any location is represented by a unique one to ten digit Directory Number (DN). DNs of different length can coexist at the same location. Termination is attempted when the system times out or when the octothorpe (#) is pressed, even if the expected number of digits (FLEN) are not dialed.

The following illustrates when termination will be attempted by FNP for various FLEN settings, DSC or LSC or TSC lengths, and digits dialed.

	DSC or LSC or TSC	+	DN
number of digits	m=1–7		FLEN-m
up to maximum of:	10 digits for DSC 16 digits for TSC no limit for TSC if FLEN=0		

Digits Expected (FLEN)	Length of DSC or LSC or TSC	Digits Dialed	Termination
7	3	7	right away.
7	3	6	# or time out.
7	2	7	right away.
7	2	6	# or time out.
10	7	10	right away.
10	5	9	# or time out.
10	5	4	not possible.
10	7	11	when 10 digits are dialed
0			according to CDP, BARS, or NARS operation.

End-of-dial timing

All NARS end-of-dial timing procedures apply to FNP along with the FNP unique Flexible Length (FLEN) processing. If the user dials the number of digits as defined by the response to the FLEN prompt, then the software considers dialing as being complete and analyzes the digits for call processing purposes.

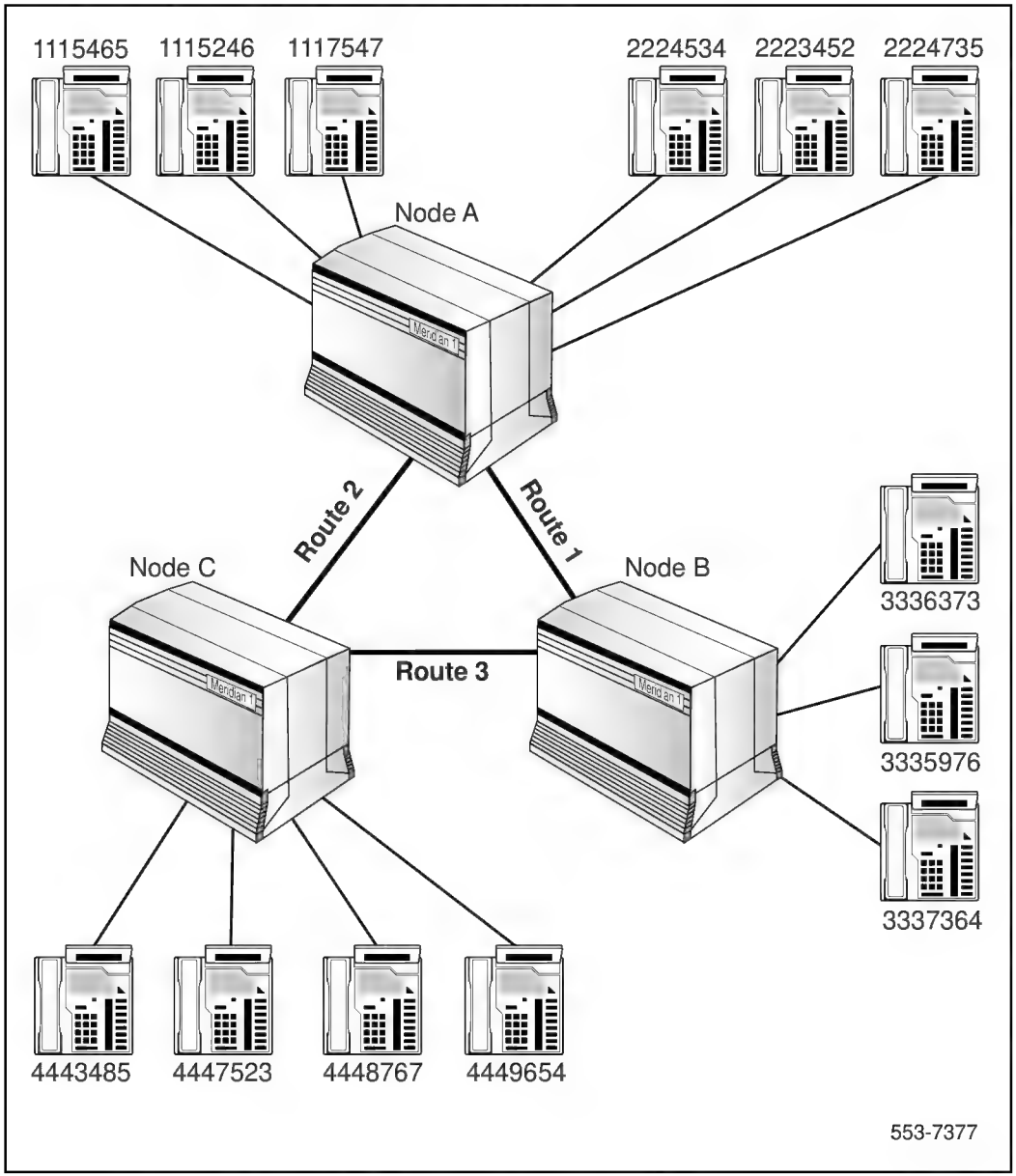
For Trunk Steering Codes (TSC) the default value for ITOH (Inhibit Time Out Handler) is "NO" allowing termination of the call to be attempted. If ITOH is set to "YES" then the call will not terminate if the NIT timer expires before the number of digits dialed reaches the value entered for FLEN.

Universal Numbering Plan

Currently, Coordinated Dialing Plan (CDP) is capable of using Local Steering Codes (LSC), Distant Steering Codes (DSC), or Trunk Steering Codes (TSC) that are one digit to seven digits long. The Global Networking Requirement calls for three to seven digit Transferable DNs (TNDNs) across the network. Furthermore, the TNDNs must be able to have variable lengths, even on the same node. In order to fulfill this requirement, one to seven digit steering codes are used. Since X11 Release 13, the maximum number of digits allowed was expanded from four to seven digits, and the maximum number of steering codes allowed was expanded from 5000 to 10000. With the introduction of FNP the maximum number of steering codes has again been increased to 32000.

Figure 1 shows an example of the Universal Numbering Plan (UNP) network with TNDNs. This network uses three digit Distant and Local Steering Codes.

Figure 1
Universal Numbering Plan with transferable DNs



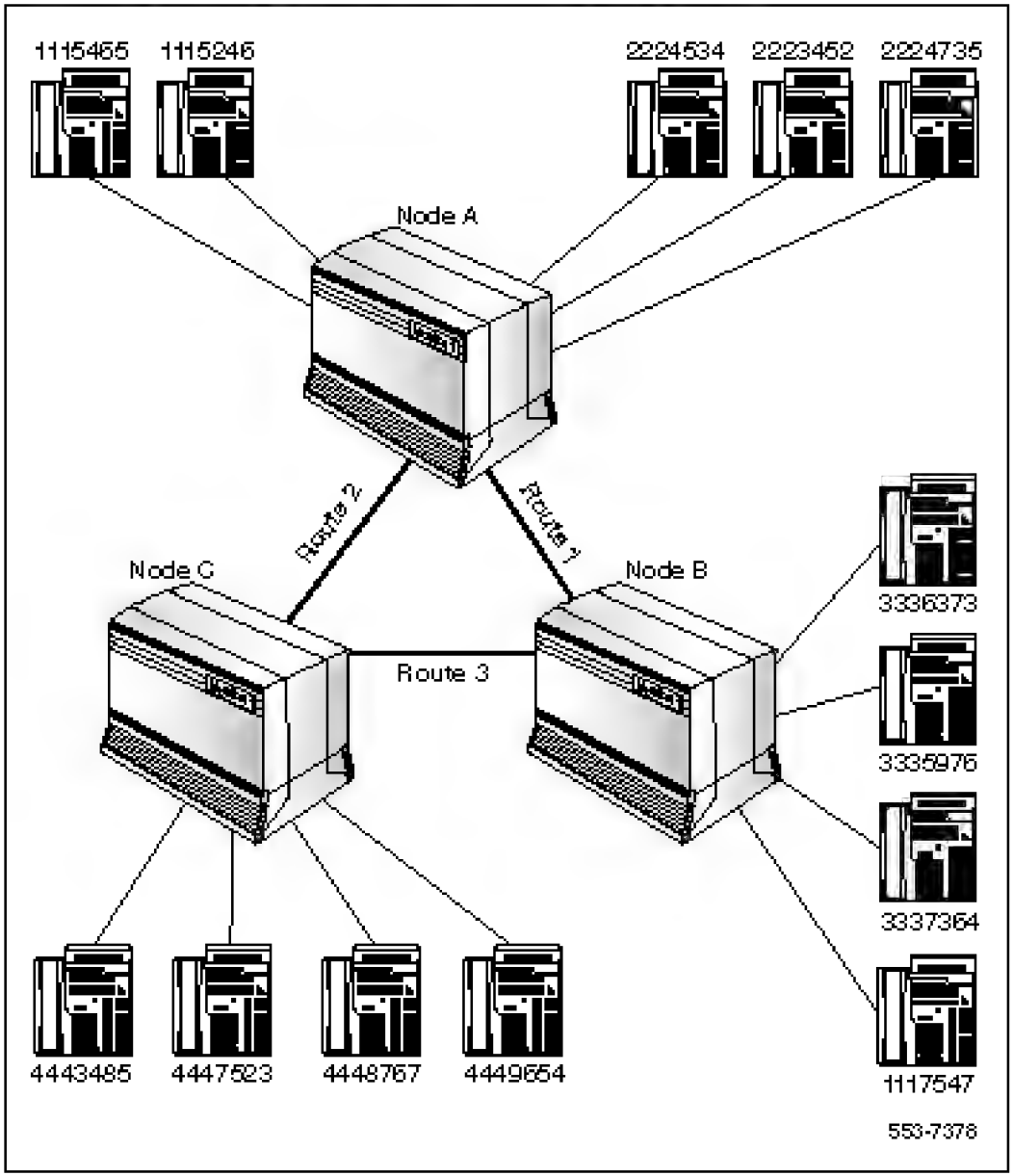
Following is an overview of the software configuration required to route calls between nodes:

	Distant Steering Code	Route Block List	Entry	Route Number	Digit Manipulation Index	Digits to Delete
A to B:	333	1	1	1	1	3
		1	2	2	2	0
A to C:	444	2	1	2	1	3
		2	2	1	2	0
B to A:	111	1	1	1	1	3
		1	2	3	2	0
	222	1	1	1	1	3
		1	2	3	2	0
B to C:	444	2	1	3	1	3
		2	2	1	2	0
C to A:	111	1	1	2	1	3
		1	2	3	2	0
	222	1	1	2	1	3
		1	2	3	2	0
C to B:	333	2	1	3	1	3
		2	2	2	2	0

	Local Steering Code	Digit Manipulation Index	Digits to Delete	Directory Numbers
A to A:	111	1	3	2565, 5246, 7547
	222	1	3	4534, 3452, 4735
B to B:	333	1	3	6373, 5976, 7364
C to C:	444	1	3	3485, 7523, 8767, 9654

Figure 2 shows the network following the move of TNDN 1117547 from node A to node B.

Figure 2
Universal Numbering Plan network following transferable DN move



Following is an overview of the software configuration following the move of TNDN 1117547:

	Distant Steering Code	Route Block List	Entry	Route Number	Digit Manipulation Index	Digits to Delete
A to B:	333	1	1	1	1	3
		1	2	2	2	0
	1117547	2	1	1	2	0
		2	2	2	2	0
A to C:	444	2	1	2	1	3
		2	2	1	2	0
B to A:	1112	3	1	1	2	0
		3	2	3	2	0
	1115	3	1	1	2	0
		3	2	3	2	0
	222	1	1	1	1	3
		1	2	3	2	0
B to C:	444	2	1	3	1	3
		2	2	1	2	0
C to A:	1112	3	1	2	2	0
		3	2	3	2	0
	1115	3	1	2	2	0
		3	2	3	2	0
	222	1	1	2	1	3
		1	2	3	2	0
C to B:	1117547	2	1	3	2	0
		3	2	2	2	0
	333	2	1	3	1	3
		2	2	2	2	0

	Local Steering Code	Digit Manipulation Index	Digits to Delete	Directory Numbers
A to A:	222	1	3	4534, 3452, 4735 1112565, 1115246
B to B:	333	1	3	6373, 5976, 7364 1117547
C to C:	444	1	3	3485, 7523, 8767, 9654

Group Dialing Plan

Group Dialing Plan (GDP) allows coordinated dialing within a larger network which uses Location codes to be set up.

Each group has an LOC that has to be dialed from outside the group as a prefix to the group Coordinated Dialing Plan: that is have LOC and CDP working together. In this case, the number dialed to a station can be different when dialed from different locations.

When Group Dialing Plan (GDP) is used, the maximum number of digits allowed for either LOC+DN, LSC+DN, or DSC+DN cannot exceed 10 digits if the dialing plan is to perform properly. Figure 3 illustrates a Group Dialing Plan network.

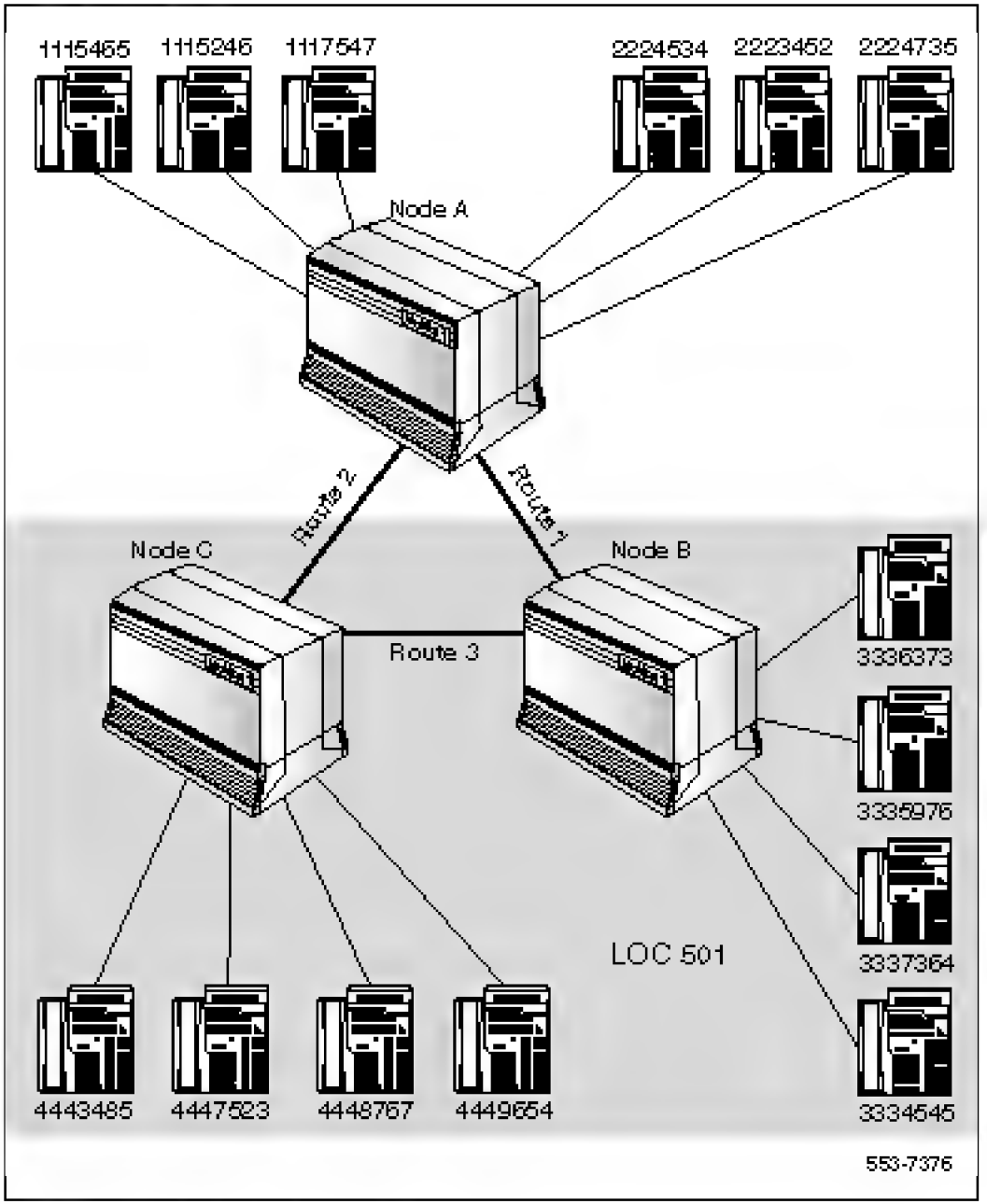
In order to get to station 6373 on node B:

— User 2565 on node A dials 501-3336373.

— User 3485 on node C dials 3336373.

— User 5976 on node B dials 6373.

Figure 3
Group Dialing Plan



Digit Display with Integrated Services Digital Network

Within an Integrated Services Digital Network (ISDN), the digit display sent or received varies depending on the digits dialed to activate the routing. This depends on the method used to configure the digits dialed (i.e. LOC, DSC). Currently, if a LOC is dialed the HLOC is sent as a prefix to the DN. Similarly, if a DSC is dialed, the LSC is prefixed before the DN. This method creates very inconsistent display formats in situations where Group Dialing Plans are used. To solve this problem, a new option is introduced to the DSC prompt sequence that allows a user to identify what prefixes the DN sent. The options are HLOC, LSC, or nothing.

LOC+DN dialing

Dialing Party sees: LOC+DN of answering party.
Called Party sees: LOC+DN of dialing party.

CDP dialing

Dialing Party sees: LSC+DN of answering party.
Called Party sees: LSC+DN of dialing party.

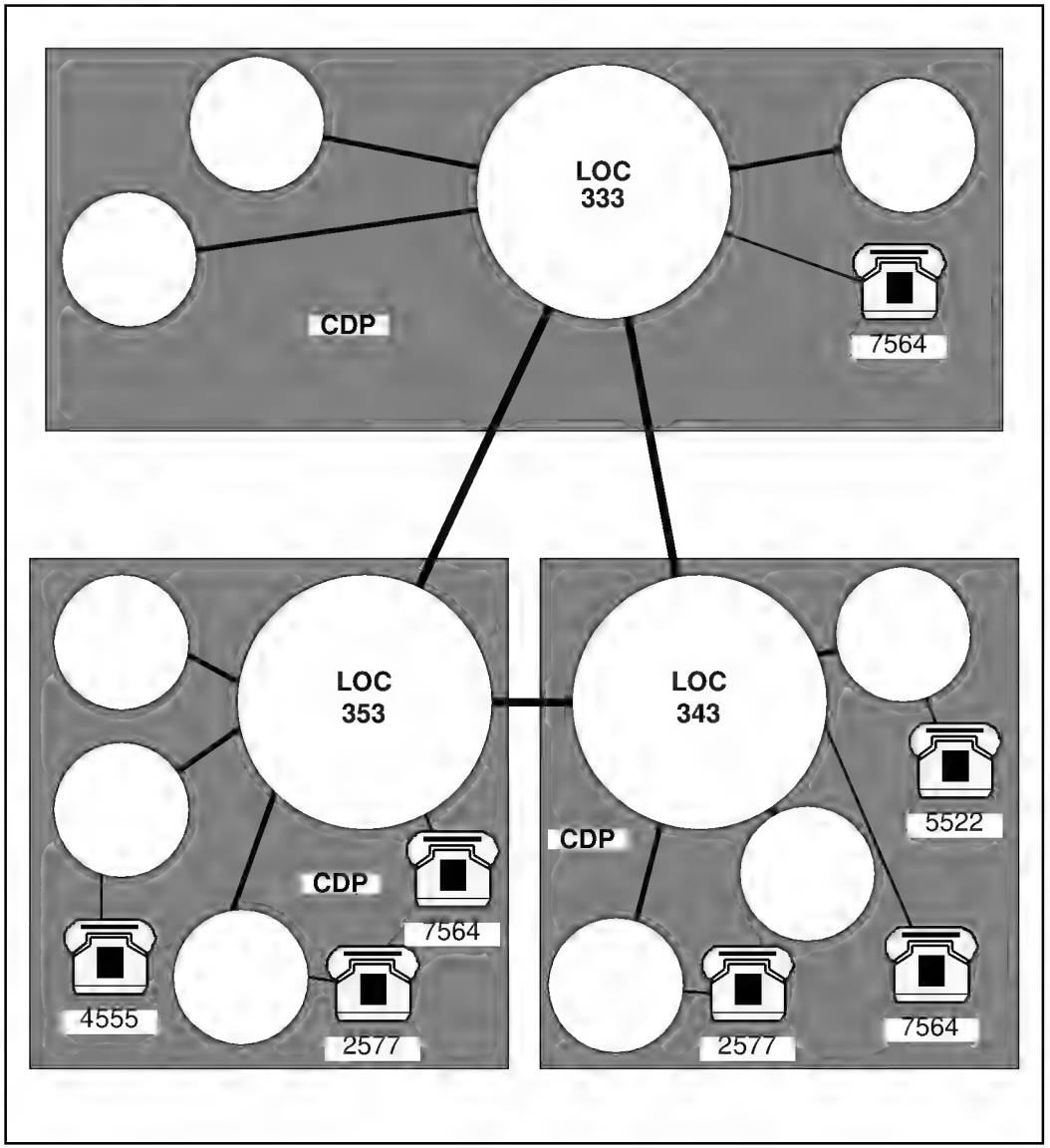
Group dialing

Depending on the option chosen on a per DSC basis, any of the following can be seen:

Dialing Party sees: LOC+DN or LSC+DN or DN of answering party.
Called Party sees: LOC+DN or LSC+DN or DN of dialing party.

Figure 4 is an example of a network which uses the Group Dialing Plan. This sample network is used to show what will be displayed by various sets within the network.

Figure 4
Sample GDP network



The following are samples of the information that will be displayed by different sets in the network.

1 Station A (7564 at location 333) trying to reach station B (7564 at location 353).
Station dials: 63537564
Station A sees: 63537564
Station B sees: H3337564
Station B answers.
Station A sees: H3537564
Station B sees: H3337564

2 Station A (7564 at location 353 trying to reach station B (2577 at location 353).
Station A dials: 63532577
Station A sees: 63532577
Station B sees: H3337564
Station B answers.
Station A sees: H3532577
Station B sees: H3337564

3 Station A (7564 at location 333) trying to reach station B (2577 at location 353).
Station A dials: 2577
Station A sees: 2577
Station B sees: H7564 or H3337564 (depending on option in DSC)
Station B answers.
Station A sees: H2577 or H3532577 (depending on option in DSC)
Station B sees: H7564 or H3337564 (depending on option in DSC)

4 Station A 333-7564 trying to reach station B 353-4555.
Station A dials: 4555
Station A sees: 4555
Station B sees: H3337564 (LOC option chosen in DSC)
Station B answers.
Station A sees: H3534555 (LOC option chosen in DSC)
Station B sees: H3337564 (LOC option chosen in DSC)

Off-net dialing

This section deals with dialing required to reach a location which is not part of the Local Network. This is typically a public exchange station, but it also includes stations that are part of another private network.

FNP introduces alternative routing for DID or DDD SPN numbers. The main purpose of alternative routing for DID or DDD SPN numbers is to define and enable alternate routing for calls recognized as remote DID or DDD SPN numbers within a private network. It will also allow for low cost routing of off-net numbers.

Alternative routing for DID or DDD SPN numbers introduces a new type of number in the SDRR block:

Alternate Routing Remote Number (ARRN).

Each ARRN has an Alternate Route List Index (ARLI) defined for it.

SDRR is applied after translating the Special Number at an intelligent NARS or BARS switch. If a match is found and specified as an ARRN number, Route Selection with the Alternate Route List Index defined for that number is performed.

Special Numbers

Currently, the length of a Special Number (SPN) can be 1 to 11 digits. When the SPN is dialed, the trunk is seized immediately. Any digits dialed afterwards are outpulsed. With the FNP feature, the system waits for FLEN of digits up to a maximum of 16 digits before attempting termination. If the user dials fewer than the FLEN of digits, termination is only attempted when the octothorpe # is pressed or when the NARS interdigit timer times out. If the FNP package is not equipped or if the value of FLEN is 0, then current operations are followed.

Note: If the SPN in question is 0, 00, 01, 011, 411, 611, 911, 800 or 1800 then the North American operation can be altered by setting the INPL prompt to YES. This will allow a flexible number of digits to be dialled and termination will be attempted only when the octothorpe # is pressed or when the NARS interdigit timer times out. For example, if SPN 00 is defined with FLEN = 0 and INPL = NO, termination can be attempted immediately after the SPN is entered and additional dialed digits will NOT be outpulsed.

The following illustrates when termination will be attempted by FNP for various FLEN settings, SPN lengths, and digits dialed.

number of digits Digit Expected (FLEN)	SPN m=1-11 Length of SPN	+ Digits Dialed	DN FLEN-m Termination
1	1	1	right way.
3	3	3	right away.
7	2	7	right away.
7	2	6	# or time out.
12	11	12	right away.
16	7	16	right away.
16	5	9	# or time out.
16	5	4	not possible.
0			according to CDP, BARS, or NARS operation.

An off-net number is recognized at a NARS or BARS intelligent switch. Translation of the SPN number identifies the method of treatment for the call.

If the response to SDRR in overlay 90 is any response other than NONE, then SDRR is applied. Then one of the following occurs:

— If the number is "denied" (i.e., response to SDRR is DENY):
standard call blocking takes place.

— If the number is defined as terminating at the local switch (i.e., response to SDRR is LDID or LDDD):
the call is terminated at the station DN for DID and at the Attendant DN for DDD.

— If the number is defined as terminating at a remote Meridian 1 or Conventional Main switch (i.e., response to SDRR is DID or DDD):
Route Selection with the RLI defined for that SPN is performed. The call is then routed to the dialed station for DID numbers or to the attendant for DDD numbers.

If the trunk route used to route the call is a Tie trunk route, then a special digit manipulation is applied so that the proper numbers are outpulsed to terminate directly at the station or attendant of the Conventional Main switch.

If the trunk route used to route the call is any trunk route other than a Tie trunk route, then the call is processed by the current software with digit manipulation if necessary.

— If the number is defined as an Alternate Routing Remote Number (i.e., response to SDRR is ARRN):
Route Selection with the ARLI defined for that ARRN is performed. Numbers declared as ARRN are leftwise unique.

Alternate Routing Remote Number (ARRN)

FLEN set to 0

When the response to the FLEN prompt in overlay 90 is "0" then:

— SPN can be between 3 and 11 digits in length.

— SDRR table entry length is limited:

- To an absolute maximum of seven digits.
- For any given SPN, to 11-X, where X is the digit length of the SPN.

FLEN is nonzero

When a response other than "0" is entered in response to the FLEN prompt, then:

— The maximum FLEN can be set to is 16.

— The maximum number of digits that can be entered in response to the SPN prompt is 11.

— The maximum number of digits that can be entered in the SDRR table is seven.

The SPN must be nine digits in length to effectively use the SDRR facility for a FLEN of 16.

In practice, for International calls, fourteen digit number translation is the maximum required. The following table summarizes the options available when the response to the FLEN prompt is a value in the range 1-16:

FLEN	SPN	SDRR
9	9	0
9	3	6
10	10	0
10	3	7
10	7	3
14	7	7
16	9	7
16	10	6
16	11	0
14	5	7

The Meridian 1 translation capability is illustrated in the following example:

A Meridian 1 customer has offices in Holland and the United Kingdom (UK).

It is commonplace for calls to be placed from the customer's UK offices to their Dutch offices by dialing the international Public Service Telephone Network (PSTN), even though private circuits and a private numbering plan exist for the routing of such calls.

The customer requires that the dialed digits be analyzed down to the third to last digit, in order to recognize their assigned Direct Dial Inward (DDI) range.

The international PSTN number is: 010 31 250 3731XX

The FLEN, determined by the actual full number length is, 14.

Therefore, the following is entered in overlay 90:

SPN	**010 31**	(only one needed for Holland)
SDRR	**ARRN**	
ARRN	**250 373 1**	

Note: To ensure proper operation in the previous example the value input in response to the FLEN prompt must be at least 14. This is arrived at by adding the number of digits entered in response to the SPN and ARRN prompts with the number of remaining digits required to route the call correctly. In the previous example five digits were entered in response to the SPN prompt, seven digits were entered in response to the ARRN prompt, and two digits were required to terminate the call at the correct number yielding a total of 14 digits. If FLEN were set to 12 in the previous example, then the last two digits would be lost, and the call would not terminate.

End-of-dial timing

For special number codes (SPN) the default value for ITOH is "NO" allowing termination of the call to be attempted. If ITOH is set to "YES" then the call will not terminate if the NIT timer expires before the number of digits dialed reaches the value entered for FLEN.

NPA and NXX

Flexible length NPA and NXX codes have been available on X11 since Release 8. This allows 3 to 10 digit (4 to 11 for 1+ dialing) NPAs and NXXs. Currently, the flexible length NPAs and NXXs do not change the number of digits a user is allowed to dial, but only changes which portions of the number are recognized as different components. If an NPA is dialed, 10 digits (11 for 1+ dialing) are expected before an attempt to terminate is made. If an NXX is dialed, 7 digits (8 for 1+ dialing) are expected before an attempt to terminate is made. The FNP feature does not change the operation of NPA and NXX dialing.

NPA + NXX + XXXX

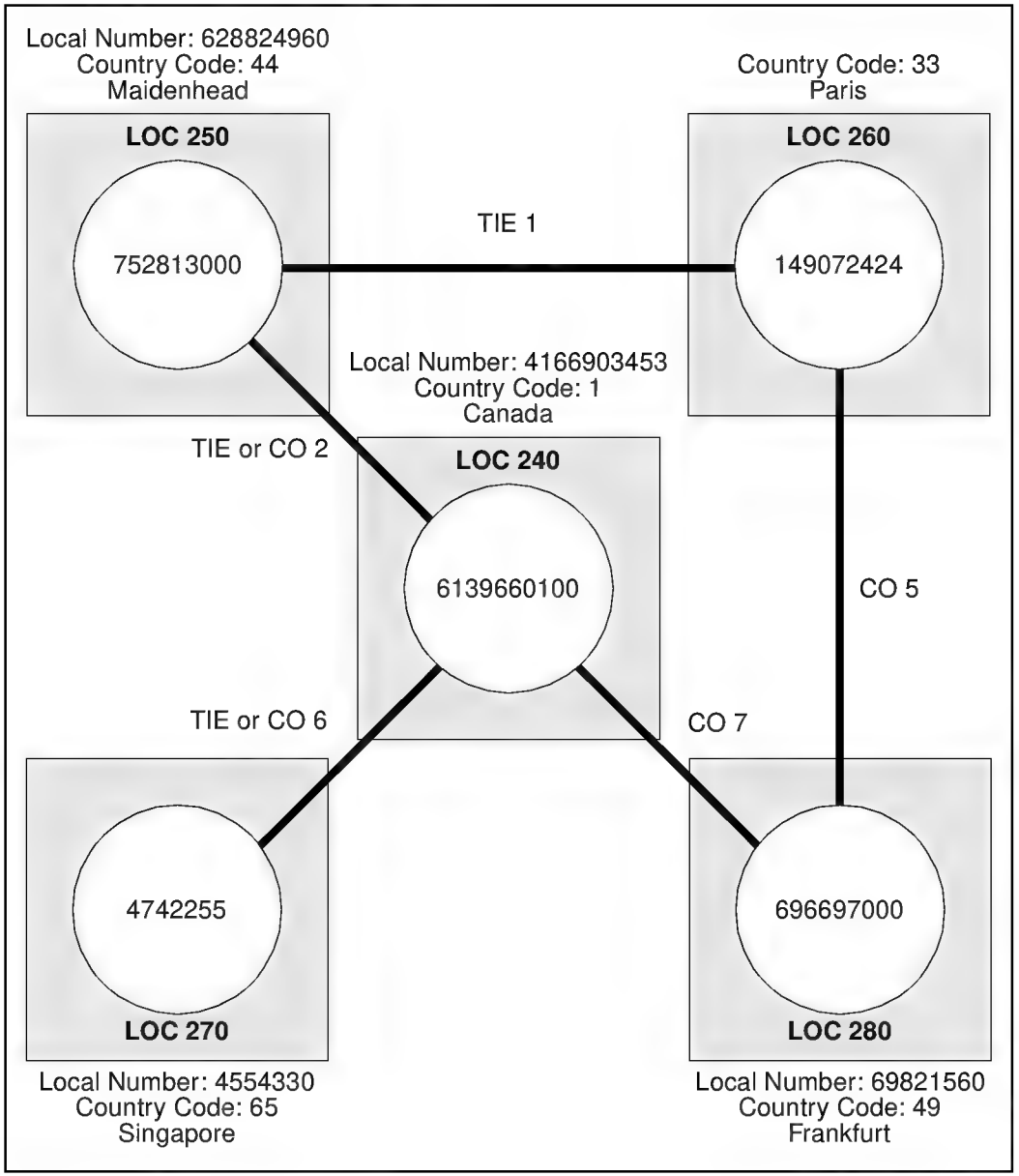
total of 10 digits (11 digits for 1+ dialing)

NXX + XXXX

total of 7 digits (8 digits for 1+ dialing)

Figure 5 illustrates a network where both off-net and on-net dialing are used.

Figure 5
Sample network to illustrate off-net dialing



On-net dialing and associated software settings

Canada to Maidenhead	AC1	LOC	TIE	DELETE	INSERT	FLEN
62501234	6	250	2	3	NONE	7
Canada to Paris	AC1	LOC	TIE	DELETE	INSERT	FLEN
62602234	6	260	2	NONE	AC1	7
Canada to Singapore	AC1	LOC	TIE	DELETE	INSERT	FLEN
62703234	6	270	6	3	NONE	7

Off-net dialing and associated software settings

Canada to Maidenhead	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-44-628824960	9	44	2		2	AC2	11
	9	44		2	NONE	011	11
Canada to Frankfurt	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-49-69821560	9	49		7	NONE	011	10
Canada to Singapore	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-65-4554339	9	65	6		2	AC2	9
	9	65		6	NONE	011	9
Paris to Frankfurt	AC2	SPN	TIE	CO	DELETE	INSERT	FLEN
9-49-69821569	9	49		5	NONE	19	10

End-of-dial timing

There can be cases where the requirements dictate that the DNs at a particular location are of varying lengths. In this case, the value of FLEN is set to the maximum DN length for that particular location before termination is attempted. If the number of digits dialed is less than the maximum DN length defined, the expiration of a timer, or the use of the "fast connect" key is required to attempt termination.

Pre X11 Release 20 ESN operation has a timer to perform NARS interdigit timing. This timer is set at a hard coded value of 8 seconds.

With X11 Release 20 and later a new NARS interdigit timer (NIT) is introduced in the customer data block. The NIT is packaged within the NARS package. Therefore, the FNP package is not required for NIT. During dialing, until a valid Network Access Code, LSC, DSC, or TSC is recognized, interdigit timing is done in the same way as it is for a regular call. Once NARS has been accessed, the NIT timer is used to perform interdigit timing. If the NIT timer expires before FLEN digits have been dialed, or an octothorpe (#) has been entered to indicate that all digits have been dialed, then an attempt is made to terminate the call.

For trunk steering codes (TSC) and special number (SPN) codes if the NIT timer expires before FLEN digits have been dialed, or an octothorpe (#) has been entered to indicate that all digits have been dialed, then operation depends on the response to the Inhibit Time Out Handling (ITOH) prompt. The ITOH option is set for TSC using LD 87 and SPN using LD 90.

If ITOH=NO (default) an attempt is made to terminate the call.
If ITOH=YES then the call will not terminate.

Vacant Number Routing

In order to keep the Transferable Numbering Plan at a manageable level, Vacant Number Routing (VNR) is introduced. Instead, of changing the numbering trees and steering codes at each location, all the routing information can be kept at one central location. When a DN is transferred from one location (A) to another (B), routing information at the two locations involved do not have to be changed. Instead all routing information can be stored at a third location (C) and this would be the only location to have its routing information updated.

If a vacant number is dialed, the call is routed to location C. This location decides where the station is located, if the station cannot be located then vacant number treatment at the terminating location is given. The DN is not treated as invalid at the location where vacant number dialing is in effect.

Administration of the Transferable Numbering Plan can be located at central switches and smaller switches can be alleviated of having to administer the entire numbering plan.

Free Calling Area Screening

The Free Calling Area Screening (FCAS) feature currently allows a six digit NPA-NXX translation which excludes "0" and "1" as the leading digit for NXX. The FCAS operation is not changed with FNP equipped.

Format:

NPA	-	NXX
3 digits		3 digits

Free Special Number Screening

A new screening capability, Free Special Number Screening (FSNS), is introduced with the FNP feature. 1 to 11 digit SPNs can be screened against three digit XXXs to allow or restrict calls going to particular XXXs. XXX can be any string of digits from 000 to 999.

Format:

SPN	-	XXX
1-11 digits		3 digits

The following is an example of how to use a one to five digit SPN associated with a five to one digit XXX for screening purposes.

input in FSNS table		real	
SPN	XXX	SPN	XXX
545	192	5	45192
545	192	54	5 192
545	192	545	192
545	192	5451	92
545	192	54519	2

Capacity Expansion

RLB and DMI Expansion

In order to support Universal Numbering Plan, the maximum number of Route List Blocks and Digit Manipulation tables allowed is increased from the current maximum of 255 to 1000. This is necessary as the need for more routes and digit manipulation is required for Global Networking. Digit manipulation is allowed for LSC as a result of the existing Local Steering Code Manipulation (LSCM) feature.

LOC, LSC, DSC TSC Expansion

In Release 13, the maximum number of LOC allowed were increased from 255 to 10000. In Release 16 maximum number of steering codes allowed were increased from 10000 to 32000.

AC1 and AC2 Expansion

Prior to the introduction of FNP AC1 and AC2 were either one- or two-digit codes. With FNP equipped AC1 and AC2 can be one- to four-digit codes.

Feature interactions

Digital Access Signaling System 2 (DASS2) and Digital Private Network Signaling System 1 (DPNSS1)

It is not possible to use Network Alternative Route Selection on *incoming* DASS2 and DPNSS1 calls. Therefore, an intelligent NARS or BARS switch must be the first DPNSS switch if the call is routed over an DPNSS network.

DN Entries

All translation entries in the same NARS or BARS translator must be leftwise unique as is the requirement for all existing translator.

ESN feature interactions

ESN features operate the same way they did prior to the introduction of FNP if FLEN is set to zero. When used along with ISDN, FNP supports features which are currently supported jointly by ESN and ISDN.

Group Dialing Plan

When Group Dialing Plan (GDP) is used, the maximum number of digits allowed for either LOC+DN, LSC+DN, or DSC+DN cannot exceed ten digits.

Integrated Services Digital Network

Integrated Services Digital Network (ISDN) requires the dialing of all the digits before the number is sent out in the D-channel "SETUP" message. In order to support ISDN with Flexible Numbering Plan, the dialed digits are sent when, the Interdigit Timer (IDT) times out, the maximum number of digits required is dialed, or an octothorpe (#) is dialed.

Vacant Number Routing

With X11 Release 23 FPE, Vacant Number Routing (VNR) is available only when FNP is enabled (FNP = YES). Therefore, VNR is only prompted in Overlay 15 when FNP = YES. When FNP is disabled, VNR is also disabled.

The Flexible Numbering Plan feature allows the user to define what is to be sent as CLID and what is to be displayed on the telephone set on a per-DSC basis. The following shows what is transmitted as CLID when a particular type of number is dialed:

type of number dialed	CLID sent
SPN	Home NPA+Home NXX+DN
NPA	Home NPA+Home NXX+DN
NXX	Home NXX+DN
LOC	Home LOC+DN
DSC, TSC	LSC+DN or LOC+DN or DN

Supplemental Digit Restriction or Recognition

The Supplemental Digit Restriction or Recognition (SDRR) feature blocks unnecessary looping through the Central Office or Public Exchange at the terminating switch when an off-net number is dialed. This feature applies to NPA, NXX, and SPN calls and works as it always has. However, the restrictions are changed to allow a variable number of digits up to eleven digits in the digit restriction table independent of the number of digits entered for the NPA, NXX, or LOC prompts.

The size of the SDRR block for a given SPN number is limited to 64 entries.

With the introduction of the Alternate Routing Remote Number (ARRN) up to sixteen digits can be analyzed for SPNs.

Transferable DNs

Transferable DNs are supported on a one to seven digit CDP. They are not supported when the eight to ten digit CDP is used.

Varying Length DNs

For a location with DNs of different lengths (e.g. five and six digit DNs), the expected number of digits for the route going to that location is set to the number of digits of the longest DN at that location. Termination to the shorter length DNs can only happen when an octothorpe is entered or when the NARS interdigit timer (NIT) times out.

Administration

Listed in this chapter are the six steps required to configure a Flexible Numbering Plan:

1 Configure Network Control (NCTL) data block in LD 87 (ESN2) as required.

2 Configure Route Data Blocks (RDB) and trunks as required.

3 Configure Electronic Switched Network (ESN) data block through LD 86 (ESN1) and ensure the following parameters are configured. See "Electronic Switched Network data" on page 40.

4 Configure Coordinated Dialing Plan and Free Special Number Screening as required in Electronic Switched Network (ESN) data block through LD 87 (ESN2). See "Electronic Switched Network data" on page 42.

5 Configure Network Translations as required in Electronic Switched Network 3 (ESN3) Translation Tables data block through LD 90 (ESN3). See "Electronic Switched Network translation tables" on page 46.

6 Configure Vacant Number Routing as required in Customer Data Block through LD 15. See "Customer Data Block administration (Pre-Release 21)" on page 51.

Electronic Switched Network data

LD 86—The Electronic Switched Network (ESN) data block administration overlay has been modified to add the MXFS and FSNI prompts, allow the creation of up to 1000 Route List Blocks and Digit Manipulation Indices, and to limit the number of Free Special Number Screening tables to 255. It is also changed to accept one to four digit access codes AC1 and AC2.

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	ESN	Electronic Switched Network data block.
MXIX	xxx	Maximum number of Incoming Trunk Group exclusion tables.
MXDM	0–1000	Maximum Digit Manipulation tables.
...		
MXFC	0-256	Maximum number of Free Calling area screening tables.
MXFS	0–255	Maximum Free Special number screening tables.
CDP	(YES) NO	Coordinated Dialing Plan.
- MXSC		Maximum Steering Codes.
	0–10000	Range for North America.
	0–32000	Range outside North America.
...		
MSCC	0-7	Maximum number of Special Common Carrier entries.
AC1	x...x	Enter one to four digit Access Code 1 (On-net access code).
AC2	x...x	Enter one to four digit Access Code 2 (Off-net access code).
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	DGT	Digit manipulation.
DMI	1–99	Digit Manipulation Index.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	RLB	Route List Block.
RLI	0–999	Route List Index.
...		
FRL	(0)-7	Facility Restriction Level.
DMI	0–999	Digit Manipulation Index.
FCI	xxx(0)	Free Calling Area Screening Index number.
FSNI	(0)–255	Free Special Number screening Index. Prompted only if FNP package (160) equipped.
...		

Electronic Switched Network data

LD 87—The Electronic Switched Network 2 (ESN2) data block administration overlay is modified to accept RLI entries from 0 to 999 and DMI entries from 0 to 999 and prompt for Flexible Length (FLEN), Inhibit Time Out Handling (ITOH), and Calling Line Identification (CLID) display format. LD 87 is also modified to allow the creation, modification and printing of Free Special Number Screening (FSNS) tables.

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	CDP	Coordinated Dialing Plan.
TYPE	LSC	Local Steering Code.
LSC	x...x	Local Steering Code x...x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped.
- DMI	0–999	Digit Manipulation Index.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	CDP	Coordinated Dialing Plan.
TYPE	TSC	Trunk Steering Code.
TSC	x...x	Trunk Steering Code x...x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped.
- FLEN	(0)–16	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits.
- ITOH	(NO) YES	Inhibit Time out Handling Prompted if FLEN set to any valid value other than zero (0). Enter NO to allow call processing to begin when the NIT timer has expired. Enter YES to allow call processing to begin only after the number of digits defined by the response to FLEN have been dialed. Default setting is NO.
...		
- RLI	0–999	Route List Index. Enter Route List Index for this TSC.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	CDP	Coordinated Dialing Plan.
TYPE	DSC	Distant Steering Code.
DSC	x...x	Distant Steering Code x...x can be one to four digits in length if DNXP package (150) is not equipped, or one to seven digits if DNXP package (150) is equipped.
- FLEN	(0)–10	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits.
- DSP	(LSC) LOC DN	Display Used to define the display format that the far-end receives (Calling Line Identification [CLID]) when ISDN or ISL trunks are involved in the connection. Prompted if ISDN package (145) is equipped. Enter LSC if the Local Steering Code plus user Directory Number (DN) are to be displayed at the far end. Enter LOC if the Location Code plus user Directory Number (DN) are to be displayed at the far end. Enter DN if the user Directory Number (DN) is to be displayed at the far end. Default setting is LSC.
...		
- RLI	0–999	Route List Index Enter Route List Index for this DSC.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	FSNS	Free Special Number Screening.
FSNI	1–255	Free Special Number Index.
SPN	x...x	Special Number x...x can be one to eleven (1-11). SPN will be re-prompted until only a <CR> (Carriage Return) is entered.
XXX	ALOW DENY	XXX codes to be allowed or denied Enter ALOW to configure Special Number codes that are to be allowed. Enter DENY to configure Special Number codes that are to be denied.
- ALOW	xxx	Allow codes Prompted if response to XXX was ALOW xxx can be entered as a three (3) digit code, (i.e., 123, where the number 123 is allowed) or as a range of three (3) digit codes, (i.e., 100 199, where all numbers in the range 100 to 199 are allowed).
- DENY	xxx	Deny codes Prompted if response to XXX was DENY xxx can be entered as a three (3) digit code, (i.e., 123, where the number 123 is denied) or as a range of three (3) digit codes, (i.e., 100 199, where all numbers in the range 100 to 199 are denied).
...		

Electronic Switched Network translation tables

LD 90—Electronic Switched Network 3 (ESN3) Translation Tables is modified to accept RLI entries from 0 to 999 and DMI entries from 1 to 999 and prompt for Flexible Length (FLEN), Inhibit Time Out Handling (ITOH), ARRN (Alternate Routing Remote Number) and ARLI (Alternate Route List Index). The ARRN and ARLI prompts will be output when:

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	NET	Network Translator.
TRAN	AC1 AC2	Translator.
TYPE	LOC	Location Code.
LOC	x...x	Location code.
- FLEN	(0)–10	Flexible Length Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins. Default is zero (0) digits.
- RLI	0–999	Route List Index Enter Route List Index for this LOC.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	NET	Network Translator.
TRAN	AC1 AC2	Translator.
TYPE	HLOC	Home Location Code.
HLOC	x...x	Home Location code (3 digits) or extended code (3-7 digits)
DMI	1–999	Digit Manipulation Index.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	NET	Network Translator
TRAN	AC1 AC2	Translator
TYPE	NPA	Numbering Plan Area code
NPA		Numbering Plan Area code translation, extended NPA code translation (a leading zero is not allowed).
	xxx xxx yyy	Area code translation. Extended NPA code translation. 3-10 digits or 4-11 digits with 1+ dialing (Release 8 and later). Enter the NPA code (xxx) and the extended code (yyy) separated by a space.
	1xxx 1xxx yyy	Area code translation (1+ dialing) Extended NPA code translation (1+ dialing). Where: xxx & yyy = 200 - 999.
...		

- RLI	0–999	Route List Index Enter Route List Index for this NPA.
- SDRR	LDID	Recognized Local Direct Inward Dial codes.
- DMI	1–999	Digit Manipulation Index
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	NET	Network Translator.
TRAN	AC1 AC2	Translator.
TYPE	NXX	Numbering plan exchange code.
NXX		Numbering Plan Exchange (Central Office) (A leading zero is not allowed).
	xxx 1xxx xxx yyy	Office code translation Office code translation (1+ dialing) Extended NXX code translation
		3-7 digits or 4-8 digits with 1+ dialing (Release 8 and later). Enter the NXX code (xxx) and the extended code (yyy) separated by a space.
	<CR>	Return to REQ.
...		
- RLI	0–999	Route List Index. Enter Route List Index for this NXX.
- SDRR	LDID	Recognized Local Direct Inward Dial codes.
- DMI	1–999	Digit Manipulation Index.
...		

Prompt	Response	Description
REQ	NEW, CHG, PRT	New, change, or print.
CUST	xx	Customer number.
FEAT	NET	Network Translator.
TRAN	AC1 AC2	Translator.
TYPE	SPN	TYPE of translation: Special Number.
SPN		Special Number
	x...x	Enter Special Number. Number can be from 1 to 11 digits.
- FLEN	(0)–16	Flexible Length
		Enter the maximum number of digits expected. When this number of digits is dialed, dialing is considered to be complete and end-of-dial processing begins.
		Default is zero (0) digits.
- ITOH	(NO) YES	Inhibit Time out Handling
		Prompted if FLEN set to any valid value other than zero (0).
		Enter NO to allow call processing to begin when the NIT timer has expired.
		Enter YES to allow call processing to begin only after the number of digits defined by the response to FLEN have been dialed.
		Default setting is NO.
- RLI		Route List Index.
	0–999	Enter Route List Index for this SPN.
- CLTP		Type of call that is defined by the special number.
	(NONE)	No call type.
	LOCL	Local.
	NATL	National.
	INTL	International.
	SSER	Special Service.
	SERH	Special Service Hold.

- SDRR		Supplemental Digit Restriction or Recognition
	ARRN	Alternate Routing Remote Number
	<CR>	Enter a Carriage Return by itself to have ITEI prompted.
- ARRN		Alternate Routing Remote Number
	x...x	Enter zero to seven digit Alternate Routing Remote Number. ***Note:*** The number of digits defined in response to SPN plus the number of digits defined in response to ARRN cannot exceed the number of digits defined by the response to FLEN, (i.e., Number of SPN digits + number of ARRN digitsð number of digits defined by response to FLEN.)
	<CR>	Enter a Carriage Return by itself to have ITEI prompted. Precede Alternate Routing Remote Number with X to remove.
- ARLI		Alternate Route List Index (Prompted if the response to ARRN is a number.)
	0 - 999	Enter any Route List Block number defined in LD 86 except the number entered in response to the previous RLI prompt.
	<CR>	Enter a Carriage Return by itself to leave the existing ARLI entry unchanged.
...		

Customer Data Block administration (Pre-Release 21)

LD 15 – The Customer Data Block administration overlay is modified to allow or deny Vacant Number Routing and modify the NARS (Network Alternate Route Selection) Interdigit Timer.

Prompt	Response	Description
REQ:	NEW, CHG	New, or change.
TYPE:	CDB	Customer Data Block
CUST	0-99	Customer number.
...		
AC2		Access Code 2
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	International
	SPN	Special Number
	LOC	Location Code
...		

VNR	(NO) YES	Vacant Number Routing Prompted only if FNP package (160) is equipped. Enter NO if vacant numbers are not to be routed to another node for treatment. Enter YES if vacant numbers are to be routed to another node for treatment. For nodes connected by trunks that use in-band signaling (DTI, DTI2, or analog trunks): The VNR setting in the terminating node's Customer Data Block determines whether or not to use Vacant Number Routing. For nodes connected by trunks that use out-of-band signaling (ISDN or ISL trunks): The VNR setting in the originating node's Customer Data Block determines whether or not to use Vacant Number Routing. Default is NO.
- RLI	0-999	Route List Index Enter route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected
- CDPL	1-(10)	Coordinated Dialing Plan Length Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing. Default is 10 digits.
- LOCL	1-(10)	Location Code Length Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing. Default is 10 digits.
NIT	2-(8)	NARS (Network Alternate Route Selection) Interdigit Timer Prompted if NARS package (58) is equipped. Enter the number of seconds allowed between CDP or LOC digits before end-of-dial processing is invoked. Default is eight (8) seconds.
...		

Customer Data Block administration (Release 21 & 22)

LD 15 – The Customer Data Block administration overlay is modified to allow or deny Vacant Number Routing and modify the NARS (Network Alternate Route Selection) Interdigit Timer.)

Prompt	Response	Description
REQ:	CHG	Change existing data block.
TYPE:	NET	Networking
CUST	0-99	Customer number.
...		
AC2		Access Code 2
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	INternational
	SPN	Special Number
	LOC	Location Code
...		

VNR	(NO) YES	Vacant Number Routing Prompted only if FNP package (160) is equipped. Enter NO if vacant numbers are not to be routed to another node for treatment. Enter YES if vacant numbers are to be routed to another node for treatment. For nodes connected by trunks that use in-band signaling (DTI, DTI2, or analog trunks): The VNR setting in the terminating node's Customer Data Block determines whether or not to use Vacant Number Routing. For nodes connected by trunks that use out-of-band signaling (ISDN or ISL trunks): The VNR setting in the originating node's Customer Data Block determines whether or not to use Vacant Number Routing. Default is NO.
- RLI	0-999	Route List Index Enter route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected
- CDPL	1-(10)	Coordinated Dialing Plan Length Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing. Default is 10 digits.
- LOCL	1-(10)	Location Code Length Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing. Default is 10 digits.
NIT	2-(8)	NARS (Network Alternate Route Selection) Interdigit Timer Prompted if NARS package (58) is equipped. Enter the number of seconds allowed between CDP or LOC digits before end-of-dial processing is invoked. Default is eight (8) seconds.
...		

Customer Data Block administration (Release 23)

LD 15 – Enable/disable the Flexible Numbering Plan feature.

Prompt	Response	Description
REQ:	CHG	Change existing data.
TYPE:	NET	Networking data.
CUST	xx	Customer number.
...		
AC2		Access Code 2
	NPA	E.164 National
	NXX	E.164 Subscriber
	INTL	INternational
	SPN	Special Number
	LOC	Location Code
FNP	(YES)	Enable the Flexible Numbering Plan feature (default).
	NO	Disable the Flexible Numbering Plan feature.
ISDN	(NO) YES	ISDN option.
...		
VNR	(NO) YES	Vacant Number Routing enabled (disabled). VNR is only prompted when FNP = YES. When FNP = NO, VNR is automatically set to NO and is, therefore, restricted.
- RLI	0-999	Route List Index Enter route list, defined in LD 86, to be used by Vacant Number Routing.
- FLEN	1-(16)	Flexible length of digits expected

- CDPL	1-(10)	Coordinated Dialing Plan Length Enter the maximum number of Coordinated Dialing Plan (CDP) digits expected by Vacant Number Routing. Default is 10 digits.
- LOCL	1-(10)	Location Code Length Enter the maximum number of Location (LOC) digits expected by Vacant Number Routing. Default is 10 digits.
...		

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Meridian 1

Flexible Numbering Plan

Description, operation, and administration

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